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| 10/502,432 | 07/25/2005 | Alexander M. Korsunsky | ISI-003US | 8126 |

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| EXAMINER | |
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| MIDKIFF, ANASTASIA | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/502,432 | KORSUNSKY, ALEXANDER M. | |
| | Examiner | Art Unit | |
| | Anastasia Midkiff | 2882 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 July 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Drawings*

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, a moveable x-ray source and the detector or array must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Additionally, the examiner suggests adding item numbers to the moveable x-ray source, collimated beams, sample, diffracted beams, and x-ray detector of the apparatus of Claims 19-20 in Figure 2 and throughout the specification.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Objections*

Claim 23 is objected to because of the following informalities:

At Line 2, change "(f)" to --(g)-- to reflect the dependence of the further method step upon the mapping of the lattice parameter in step (f) of the parent claim 21.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to Claim 4, a broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render

a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

In the present instance, claim 4 recites the broad recitation "the energy of the collimated X-ray beam is ≥ 60 keV" in Line 2, and the claim also recites "preferably in the range of from 100 to 300 keV" in Lines 2-3, which is the narrower statement of the range/limitation.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4-15 and 17-23 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent to Hall (US 6,072,853).

With respect to Claims 1-2, 5-9, and 18-21, Hall teaches an x-ray diffraction apparatus for the analysis of polycrystalline materials, and the method for its use, comprising:

- providing a polycrystalline material sample (15) for analysis (Column 3 Lines 26-30, and Column 4 Lines 4-6);

- providing a polychromatic x-ray source (11; see Column 5, Lines 49-51), wherein the source produces x-rays (13) by accelerating charged particles to energies of no more than 500 MeV (Column 3, Lines 14-26);
- collimating x-rays (13) from the polychromatic x-ray source into a beam having a divergence in the range of from $10^{-4}$ to $10^{-2}$ radians (Column 3 Lines 34-35, and Column 4 Lines 53-61), and a penetration depth of ≥ 1 mm (Column 2 Lines 55-65, Column 3 Lines 14-30, and Column 7 Lines 36-43);
- exposing sample to the collimated x-ray beam by scanning the sample with the x-ray beam (Column 7 Lines 31-43), wherein the sample remains stationary (Column 2, Lines 63-65, and Column 7 Lines 31-43) and the x-ray beam is diffracted (Column 6, Lines 5-6);
- collecting at least some of the diffracted x-rays in an energy dispersive x-ray detector (Column 6, Lines 5-40); and,
- analyzing the collected, diffracted x-rays to map the lattice parameter in the polycrystalline material (Column 3 Lines 51-57, Column 6 Lines 5-16, Column 7 Lines 17-40, and Column 8 Lines 52-62).

With respect to Claim 4, Hall further teaches that the energy of the collimated x-ray beam is in the range of 100-300 keV (Column 5 Lines 59-62).

With respect to Claims 10-12 and 23, Hall further teaches that lattice parameter determination is used to provide information on and map phase distribution and sub-surface stresses or strains in the polycrystalline material (Column 3 Lines 51-57,

Column 6 Lines 5-16, Column 7 Lines 17-40, and Column 8 Lines 52-62) at a depth of ≥ 1 mm (Column 2 Lines 55-65, Column 3 Lines 14-30, and Column 7 Lines 36-43).

With respect to Claims 13 and 22, Hall further teaches that the polycrystalline material is an engineering material or a natural material, or component part thereof (Column 3 Lines 66-67, and Column 4 Lines 1-6).

With respect to Claims 14, 15, and 17, Hall further teaches that said polycrystalline material comprises a metal and a crystalline polymer in a composite with a crystalline phase (Column 3 Lines 66-67, and Column 4 Lines 1-6), and has a thickness of ≥ 1 mm (Column 2 Lines 55-65, Column 3 Lines 14-30, and Column 7 Lines 36-43).

Claims 1, 2, 4-6, 8-15, and 17-23 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent to Siewert et al. (US 5,589,690).

With respect to Claims 1-2, 5-6, 8-9, and 18-21, Siewert et al. teach an x-ray diffraction apparatus for the analysis of polycrystalline materials, and the method for its use, comprising:

- providing a polycrystalline material sample (30, 34, 38) for analysis (Column 2 Lines 18-36, Column 4 Lines 42-43, and Column 11 Lines 14-15);
- providing a polychromatic x-ray source (10), wherein the source produces x-rays by accelerating charged particles to energies of no more than 500 MeV (Column 4 Lines 55-61 and Column 12 Lines 37-38);

- collimating x-rays from the polychromatic x-ray source into a beam having a divergence in the range of from $10^{-4}$ to $10^{-2}$ radians (14; see Column 4 43-46, Column 6 Lines 66-67, and Column 7 Lines 1-12), and a penetration depth of ≥ 1 mm (Column 6 Lines 31-35, Figure 3, Column 10 Lines 50-67, and Column 11 Lines 1-19);
- exposing sample to the collimated x-ray beam by scanning the sample with the x-ray beam (Column 11, Lines 42-47), wherein the x-ray beam is diffracted (Column 4, Lines 55-64);
- collecting at least some of the diffracted x-rays in an energy dispersive x-ray detector (22; see Column 8, Lines 8-23); and,
- analyzing the collected, diffracted x-rays to map the lattice parameter in the polycrystalline material (Column 10, Lines 10-46).

With respect to Claim 4, Siewert et al. further teach that the energy of the collimated x-ray beam is in the range of 100-300 keV (Column 12 Lines 37-35).

With respect to Claims 10-12 and 23, Siewert et al. further teach that lattice parameter determination is used to provide information on and map phase distribution and sub-surface stresses or strains in the polycrystalline material at a depth of ≥ 1 mm (Column 10, Lines 10-46).

With respect to Claims 13 and 22, Siewert et al. further teach that the polycrystalline material is an engineering material or a natural material, or component part thereof (Column 2, Lines 19-36).

With respect to Claims 14, 15, and 17, Siewert et al. further teach that said polycrystalline material comprises a metal and a crystalline polymer in a composite with a crystalline phase, and has a thickness of ≥ 1 mm (Column 2, Lines 19-36, Column 10 Lines 50-52 and 66-67, Column 11 Lines 1-3, 14-17, and 32-34).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hall in view of Canberra Capabilities Profile Brochure (April 2002).

With respect to Claim 3, Hall teaches most of the elements of the claimed invention, including an energy dispersive germanium x-ray detector (Column 6, Lines 5-40), but does not specifically teach that said detector has a relative energy resolution of from $0.5 \times 10^{-2}$ to $5 \times 10^{-2}$.

Canberra teaches a germanium x-ray energy dispersive detector for x-ray diffraction analysis (Page 21), wherein Applicant admits such detectors having a resolution of from $0.5 \times 10^{-2}$ to $5 \times 10^{-2}$ were known at the time of invention to be suitable sources for the methods of the present invention (see Specification, Page 5, Lines 1-10).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a high-resolution germanium energy dispersive x-ray detector in the method of Hall, to provide a suitable high quality detector for x-ray diffraction analysis of polycrystalline material, as suggested by Canberra, and as admitted by Applicant (see Specification, Page 5, Lines 1-10).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Siewert et al. in view of Canberra Capabilities Profile Brochure (April 2002).

With respect to Claim 3, Siewert et al. teach most of the elements of the claimed invention, including an energy dispersive germanium x-ray detector (Column 8, Lines 8-23), but does not specifically teach that said detector has a relative energy resolution of from $0.5 \times 10^{-2}$ to $5 \times 10^{-2}$.

Canberra teaches a germanium x-ray energy dispersive detector for x-ray diffraction analysis (Page 21), wherein Applicant admits such detectors having a resolution of from $0.5 \times 10^{-2}$ to $5 \times 10^{-2}$ were known at the time of invention to be suitable sources for the methods of the present invention (see Specification, Page 5, Lines 1-10).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a high-resolution germanium energy dispersive x-ray detector in the method of Hall, to provide a suitable high quality detector for x-ray diffraction analysis of polycrystalline material, as suggested by Canberra, and as admitted by Applicant (see Specification, Page 5, Lines 1-10).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Siewert et al., as applied to Claim 6 above, and in view of U.S. Patent to Mitchell (US 4,561,062).

With respect to Claim 7, Siewert et al. teaches most of the elements of the claimed invention, including scanning the material with the x-ray source (Column 11, Lines 42-47), but do not teach that the polycrystalline material is held stationary during scanning.

Mitchell et al. teach an x-ray diffraction stress analysis method wherein a polycrystalline material is stationary while being scanned by an x-ray source (Column 7, Lines 48-66), so that large samples may be scanned in the field (Abstract Lines 1-11, and Column 8 Lines 24-27).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a stationary sample scanning method in the method of Siewert et al. to provide a portable scanner for large specimens, as suggested by Mitchell et al. (Abstract Lines 1-11, and Column 8 Lines 24-27).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Siewert et al., as applied to Claim 15 above, and in view of U.S. Patent to Mitchell (US 4,561,062),and further in view of International Application Publication to Arnott, et al. (WO 91/08372, PCT/GB90/01854).

With respect to Claim 16, Siewert et al. teach most of the elements of the claimed invention, including analysis of polycrystalline material that comprises an engineering article or component thereof.

Siewert et al. does not specifically teach that polycrystalline material is a glass or ceramic reinforced metal matrix.

Mitchell et al. teach an x-ray diffraction stress analysis method wherein a polycrystalline material is stationary while being scanned by an x-ray source (Column 7, Lines 48-66), so that large samples such as pipelines may be scanned in the field (Abstract Lines 1-11, and Column 8 Lines 24-27).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a stationary sample scanning method in the method of Siewert et al. to provide a portable scanner for large specimens such as pipelines, as suggested by Mitchell et al. (Abstract Lines 1-11, and Column 8 Lines 24-27).

Mitchell et al. is silent with respect to the material of the pipeline inspected.

Arnott et al. teach that pipelines for carrying oil are protected from fire and corrosion by covering a metal matrix base material with a glass or ceramic coating (Abstract and Page 3, Lines 5-18).

It would have been obvious to one of ordinary skill in the art to inspect a fire-protected oil pipeline of Arnott (Abstract and Page 3, Lines 5-18) in the method of Siewert et al. and Mitchell et al., to analyze said pipeline for stresses in the field that may cause dangerous and costly oil leaks, as suggested by Mitchell et al. (Abstract Lines 1-11, and Column 8 Lines 24-27).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hall, as applied to Claim 15 above, and in view of U.S. Patent to Mitchell (US 4,561,062),and further in view of International Application Publication to Arnott, et al. (WO 91/08372, PCT/GB90/01854).

With respect to Claim 16, Hall teaches most of the elements of the claimed invention, including analysis of polycrystalline material that comprises an engineering article or component thereof (Column 4, Lines 1-6).

Hall does not specifically teach that polycrystalline material is a glass or ceramic reinforced metal matrix.

Mitchell et al. teach an x-ray diffraction stress analysis method wherein a polycrystalline material is stationary while being scanned by an x-ray source (Column 7, Lines 48-66), so that large samples such as pipelines may be scanned in the field (Abstract Lines 1-11, and Column 8 Lines 24-27).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a stationary sample scanning method in the method of Hall to provide a portable scanner for large specimens such as pipelines, as suggested by Mitchell et al. (Abstract Lines 1-11, and Column 8 Lines 24-27).

Mitchell et al. is silent with respect to the material of the pipeline inspected.

Arnott et al. teach that pipelines for carrying oil are protected from fire and corrosion by covering a metal matrix base material with a glass or ceramic coating (Abstract and Page 3, Lines 5-18).

It would have been obvious to one of ordinary skill in the art to inspect a fire-protected oil pipeline of Arnott (Abstract and Page 3, Lines 5-18) in the method of Hall and Mitchell et al., to analyze said pipeline for stresses in the field that may cause dangerous and costly oil leaks, as suggested by Mitchell et al. (Abstract Lines 1-11, and Column 8 Lines 24-27).

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Documents to: Kusumoto et al. (US 4,284,887), Wölfel et al. (US 4,364,122), Yamamoto et al. (US 4,916,720), Fujiwara (US 5,878,106), Dube et al. (US 6,269,144 B1), and Green (US 7,065,175 B2) teach x-ray diffraction apparatus and methods with small divergence x-ray beams and polycrystalline samples; and Kurtz et al. (US 2003/0012334 A1) teaches scanning methods for an x-ray diffraction apparatus.

Canberra brochure "Germanium Detectors" (January 2003) teaches energy dispersive high-resolution germanium detectors for use in x-ray diffraction.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anastasia Midkiff whose telephone number is 571-272-5053. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ASM
7/16/07

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